

FINAL TECHNICAL REPORT, NASA GRANT NAG5-8909, Planetary Geology and Geophysics Program. Expiration 7/14/04.

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Grant NAG5-8909 supported both geological mapping and topical studies, primarily in the southern Acidalia Planitia/Cydonia Mensae region of Mars. The overall objective was to understand geologic processes and crustal history in the northern lowland in order to assess the probability that an ocean once existed in this region. The major deliverable is a block of 6 1:500,000 scale geologic maps that will be published in 2004 as a single map at 1:1,000,000 scale along with extensive descriptive and interpretive text. A major issue addressed by the mapping was the relative ages of the extensive plains of Acidalia Planitia and the knobs and mesas of Cydonia Mensae. The mapping results clearly favor a younger age for the plains. Topical studies included a preliminary analysis of the very abundant small domes and cones to assess the possibility that their origins could be determined by detailed mapping and remote-sensing analysis. We also tested the validity of putative shorelines by using GIS to co-register full-resolution MOLA altimetry data and Viking images with these shorelines plotted on them. Of the 3 proposed shorelines in this area, one is probably valid, one is definitely not valid, and the third is apparently 2 shorelines closely spaced in elevation. Publications supported entirely or in part by this grant are listed below.

McGill, G.E., 2001, The Utopia Basin revisited: Regional slope and shorelines from MOLA profiles, *Geophysical Research Letters*, 28, 411-414.

Buczkowski, D.L. and G.E. McGill, 2002, Topography within circular grabens: Implications for polygon origin, Utopia Planitia, Mars, *Geophysical Research Letters*, 29(7), 10.1029/2001GL014100.

Buczkowski, D.L., and G.E. McGill, 2002, MOLA topography supports drape-folding models for polygonal terrain of Utopia Planitia, Mars, Lunar and Planet. Sci. XXXIII, abstract #1020 (CD-ROM), 2 pages.

McGill, G.E., 2002, The small domes and pits of Cydonia Mensae and adjacent Acidalia Planitia, Mars: Implications for the role of near-surface water or ice, Lunar Planet. Sci. XXXIII, abstract #1126 (CD-ROM), 2 pages.

McGill, G.E., 2002, Geology of the Cydonia Mensae/southern Acidalia Planitia area, Mars, Abstracts, Planetary Geologic Mappers Meeting, Tempe, AZ (CD-ROM). 2 pages.

Webb, V.E., and G.E. McGill, 2003, Assessing the geomorphic development of putative shorelines contiguous to northern Arabia Terra, Mars, Lunar Planet. Sci. XXXIV, abs. #1132 (CDROM), 2 pages.

Buczkowski, D.L., M. L. Cooke, and G.E. McGill, 2003, Double-ringed circular grabens and thickness of cover material in Utopia Planitia, Mars, Lunar Planet. Sci. XXXIV, abs. #1042 (CDROM), 2 pages.

Buczkowski, D.L., and G.E. McGill, 2003, Utopia Planitia: Observations and models favoring thick water-deposited sediments, 6th International Conf. on Mars, abs. #3031 (CDROM), 4 pages.

Webb, V.E., and G.E. McGill, 2003, Evaluating putative shorelines adjacent to the dichotomy boundary near Arabia Terra, 6th International Conf. on Mars, abs. #3108 (CDROM), 4 pages.

McGill, G.E., 2004, Geologic map of Cydonia Mensae-southern Acidalia Planitia, Mars: Quadrangles 40007, 40012, 40017, 45007, 45012, 45017, U.S. Geological Survey, Geologic Investigations Series, Map I-2811.